

PQ1Uxx1M2ZPH Series

Low Output Current, Compact Surface Mount Type
Low Power-Loss Voltage Regulators

■ Features

- 1.Compact surface mount package (2.9×1.6×1.1mm)
- 2.Low power-loss
(Dropout voltage: TYP. 0.11 V at $I_o=60\text{mA}$)
- 3.High ripple rejection (TYP. 70dB)
- 4.Built-in ON/OFF control function
(Dissipation current at OFF-state: MAX. 1 μA)
- 5.Built-in overcurrent, overheat protection functions
*It is available for every 0.1V of output voltage (1.3V to 5.0V)
- 6.RoHS directive compliant

■ Applications

- 1.Cellular phones
- 2.Cordless phones
- 3.Personal information tools (PDA)
- 4.Cameras/Camcoders
- 5.PCMCIA cards for notebook PCs

■ Model Line-up

Output Voltage (TYP.)	Model No.	Output Voltage (TYP.)	Model No.
1.8V	PQ1U181M2ZPH	3.5V	PQ1U351M2ZPH
2.5V	PQ1U251M2ZPH	5.0V	PQ1U501M2ZPH
2.8V	PQ1U281M2ZPH		
3.0V	PQ1U301M2ZPH		
3.3V	PQ1U331M2ZPH		

■ Absolute Maximum Ratings

(Ta=25°C)

Parameter	Symbol	Rating	Unit
*1 Input voltage	V_{IN}	16	V
*1 ON/OFF control terminal voltage	V_C	16	V
Output current	I_o	300	mA
*2 Power dissipation	P_D	350	mW
*3 Junction temperature	T_j	150	°C
Operating temperature	T_{opr}	-30 to +85	°C
Storage temperature	T_{stg}	-55 to +150	°C
Soldering temperature	T_{sol}	270(10s)	°C

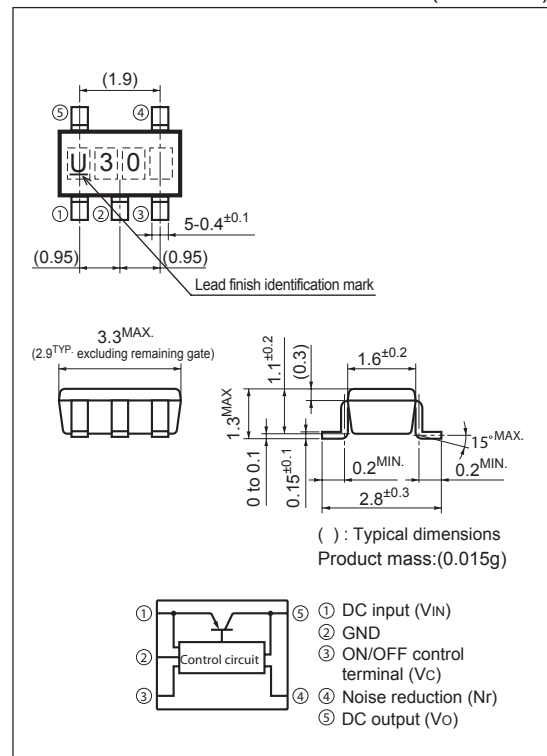
*1 All are open except GND and applicable terminals.

*2 At mounted on PCB

*3 Overheat protection may operate at $T_j=125^\circ\text{C}$ to 150°C

■ Outline Dimensions

(Unit : mm)



Lead finish:Lead-free solder plating
(Composition: Sn2Cu)

Notice The content of data sheet is subject to change without prior notice.

In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that may occur in equipment using any SHARP devices shown in catalogs, data books, etc. Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device.

■ Electrical Characteristics

(Unless otherwise specified, $V_{IN}=V_O(TYP) + 1.0V$, $I_O=30mA$, $V_C=1.8V$, $T_a=25^\circ C$)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output voltage	V_O	-	Refer to the following table.1			V
*4 Output peak current	I_{OP}	-	180	300	-	mA
Recommended output current	-	-	-	-	150	mA
Load regulation	RegL1	$I_O=5$ to 60mA	-	10	50	mV
	RegL2	$I_O=5$ to 100mA	-	20	100	mV
	RegL3	$I_O=5$ to 150mA	-	30	160	mV
Line regulation	RegL	$V_{IN}=V_O(TYP)+1V$ to $V_O(TYP)+6V$	-	3.0	20	mV
Temperature coefficient of output voltage	$T_C V_O$	$I_O=10mA$, $T_j=-25$ to $+75^\circ C$	-	0.05	-	mV/ $^\circ C$
Ripple rejection	RR	Refer to Fig.2	-	70	-	dB
Output noise voltage	$V_{NO}(rms)$	$10Hz < f < 100kHz$, $C_n=0.1\mu F$, $I_O=30mA$	Refer to the following table.2			μV
*8 Dropout voltage	V_{I-O1}	$I_O=60mA$ *5	-	0.11	0.26	V
	V_{I-O2}	$I_O=150mA$ *5	-	0.20	0.4	
*6 ON-state voltage for control	$V_{C(ON)}$	-	1.8	-	-	V
ON-state current for control	$I_{C(ON)}$	$V_C=1.8V$	-	5	30	μA
OFF-state voltage for control	$V_{C(OFF)}$	-	-	-	0.4	V
Quiescent current	I_Q	$I_O=0mA$	-	130	200	μA
Output OFF-state dissipation current	I_{QS}	$V_C=0.2V$	-	-	1	μA

*4 Output current shall be the value when output voltage lowers 0.3V from the voltage at $I_O=30mA$.

*5 Input voltage when output voltage falls 0.1V from that at $V_{IN}=V_O(TYP)+1.0V$.

*6 In case that the control terminal (③ pin) is open, output voltage should be OFF state.

*7 In case of PQ1U181M2ZPH, V_{IN} minimum=2.3V.

*8 Excluding PQ1U181M2ZPH

Table.1 Output Voltage

($V_{IN}=V_O(TYP)+1.0V$, $I_O=30mA$, $V_C=1.8V$, $T_a=25^\circ C$)

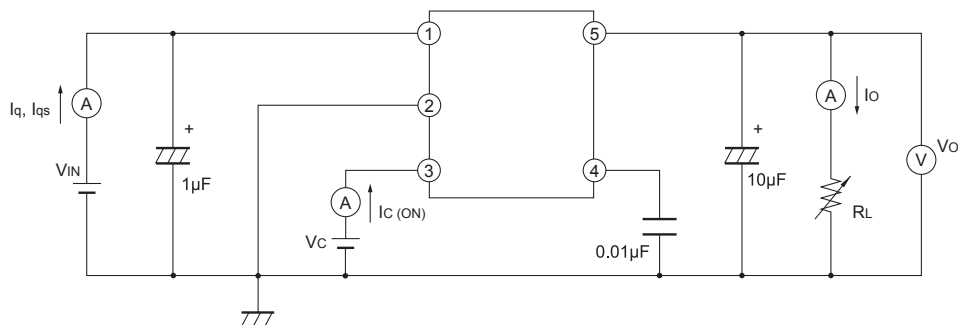
Model No.	Symbol	MIN.	TYP.	MAX.	Unit
PQ1U181M2ZPH	V_O	1.740	1.8	1.860	V
PQ1U251M2ZPH		2.440	2.5	2.560	
PQ1U281M2ZPH		2.740	2.8	2.860	
PQ1U301M2ZPH		2.940	3.0	3.060	
PQ1U331M2ZPH		3.234	3.3	3.366	
PQ1U351M2ZPH		3.430	3.5	3.570	
PQ1U501M2ZPH		4.900	5.0	5.100	

Table.2 Output Noise Voltage

($V_{IN}=V_O(TYP)+1.0V$, $I_O=30mA$, $V_C=1.8V$, $C_n=0.1\mu F$, $10Hz < f < 100kHz$, $T_a=25^\circ C$)

Model No.	Symbol	MIN.	TYP.	MAX.	Unit
PQ1U181M2ZPH	$V_{NO}(rms)$	-	15	-	μV
PQ1U251M2ZPH		-	25	-	
PQ1U281M2ZPH		-	25	-	
PQ1U301M2ZPH		-	30	-	
PQ1U331M2ZPH		-	30	-	
PQ1U351M2ZPH		-	35	-	
PQ1U501M2ZPH		-	50	-	

Fig.1 Test Circuit



$f=400\text{Hz}(\text{sine wave})$
 $e_i(\text{rms})=100\text{mV}$
 $V_{IN}=V_o(\text{TYP})+1.0\text{V}$
 $V_c=1.8\text{V}$
 $I_o=10\text{mA}$
 $RR=20\log(e_i(\text{rms})/e_o(\text{rms}))$

The graph shows the power dissipation P_D (mW) as a function of ambient temperature T_a (°C) for the 74VHC00. The power dissipation is constant at 350 mW for temperatures from -30°C to 25°C. It then decreases linearly to 0 mW at 150°C. A shaded region indicates the maximum power dissipation range from 25°C to 85°C, and a dashed line shows the maximum power dissipation range from 85°C to 150°C.

Ambient temperature T_a (°C)	Power dissipation P_D (mW)
-30	350
-25	350
0	350
25	350
50	350
75	250
85	200
100	150
125	100
150	0

Graph of Relative output voltage (%) vs Output current I_o (A) for the typical value of characteristics at $T_a = 25^\circ\text{C}$. The curve shows a sharp drop in voltage starting around 0.28A, reaching 0% at approximately 0.32A.

Figure 10 is a line graph showing the output voltage fluctuation ΔV_o (mV) on the y-axis versus the junction temperature T_J (°C) on the x-axis. The y-axis ranges from -60 to 60 mV in increments of 10. The x-axis ranges from -30 to 140°C in increments of 20. The curve starts at approximately -1 mV at -30°C, rises to a peak of about 2 mV at 0°C, and then decreases steadily to approximately -18 mV at 140°C. The graph includes a grid. Parameters listed in the top right corner are: $V_{IN}=3.8V$, $I_O=30mA$, $V_C=1.8V$, and $C_O=10\mu F$.

Figure 10 is a graph showing the typical load regulation characteristics of the device. The Y-axis represents the Output voltage V_O (V), ranging from 0 to 4. The X-axis represents the Input voltage V_{IN} (V), ranging from 0 to 7. The graph displays four curves for different load resistances: $R_L = \infty$, $R_L = 56\Omega$, $R_L = 28\Omega$, and $R_L = 18.7\Omega$. The output voltage is constant at approximately 2.8V for all load conditions. The graph also indicates $T_a = 25^\circ\text{C}$, $C_{IN} = 1\mu\text{F}$, and $C_O = 10\mu\text{F}$.

Fig.7 Circuit Operating Current vs. Input Voltage (PQ1U281M2ZPH)(Typical Value)

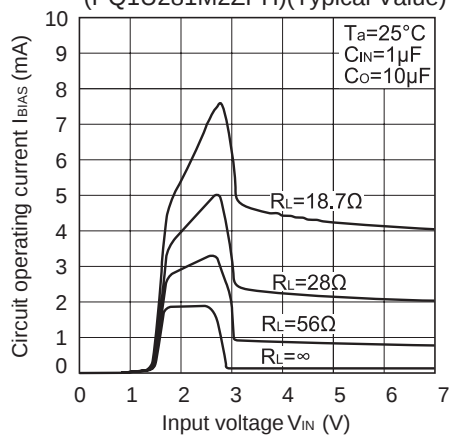


Fig.8 Dropout Voltage vs. Junction Temperature (PQ1U281M2ZPH)(Typical Value)

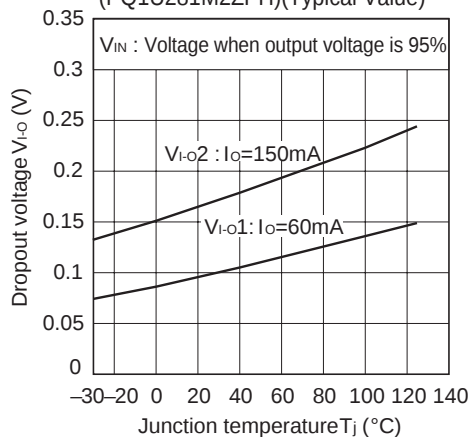


Fig.9 Quiescent Current vs. Junction Temperature (Typical Value)

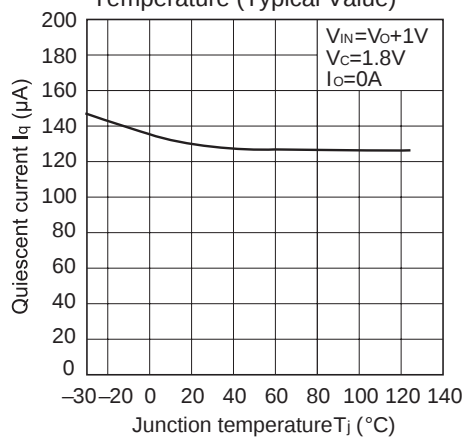


Fig.10 Ripple Rejection vs. Input Ripple Frequency (PQ1U281M2ZPH)(Typical Value)

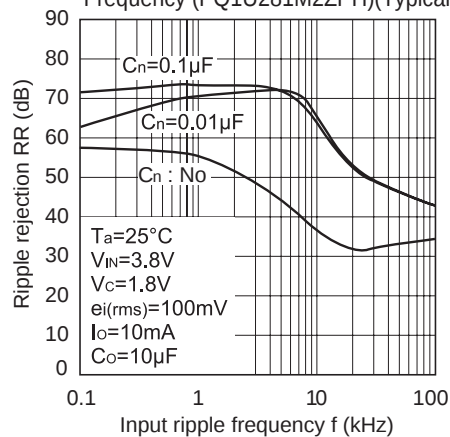


Fig.11 Dropout Voltage vs. Output Current (Typical Value)

